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III.—NOTES ON THE DISTRIBUTION OF PELAGIC CRUSTACEA IN LOWER AND UPPER LOCH FYNE.

By THOMAS SCOTT, LL.D., F.L.S.

The following notes on the distribution of pelagic crustacea in Lower and Upper Loch Fyne describe the results obtained by the examination of numerous tow-net gatherings collected during the four years from 1905 to 1908, both years inclusive.

The gatherings were collected at several fixed stations located in mid-channel, two of them being situated in Lower Loch Fyne and the others in the upper portion of the loch.

The outermost station in Lower Loch Fyne (Stat. I.) is situated in mid-channel and nearly due east of the north end of Barmore Peninsula, and the other (Stat II.) nearly midway between Maol Dubh Point on the west and Kilfinan Bay on the east side of the loch. Those in Upper Loch Fyne are arranged as follows :—Station III. is distant fully one mile and almost directly south-east of the village of North Kames; Station IV. is about three-quarters of a mile south-east of Kilmichael Beg; Station V. is midway between Pennimore on the west and Newton Bay on the east side of the loch; while Station VI. is situated off the mouth of the Douglas Water and distant north by east from Strachur about a mile.

Nearly six hundred gatherings have been collected during the four years. A small proportion of them (and nearly all in the first year) consisted of horizontal hauls; the others were vertical—that is, the net was lowered to the depth required and then hauled straight up. The gatherings are from various depths, regulated by the depth of water at the station where they were collected. At the deep-water stations, *i.e.*, the two in Lower Loch Fyne and Stations v. and vi. in the Upper Loch, a horizontal gathering was collected in the first year at or near the surface, and others at mid-water and bottom, while the vertical hauls were usually taken at intervals of fifteen fathoms, beginning at fifteen fathoms from the surface, down to sixty fathoms, and also one from the bottom if the depth was much over sixty fathoms.

The following is a tabulated list of the Stations, giving the number of gatherings, horizontal and vertical, collected at each of them during each of the four years :—

Numbers of the Stations.	Number of Gatherings Collected during—				Totals for each Station.
	1905.	1906.	1907.	1908.	
Station I. (Barmore) ..	49	24	21	10	104
„ II. (Kilfinan) ..	29	19	29	23	100
„ III. (Kames)	31	10	11	16	68
„ IV. (Kilmichael Beg)..	30	10	12	9	61
„ V. (Newton).. ..	43	21	21	30	115
„ VI. (Strachur) ..	60	25	24	34	143
Totals for each Year ..	242	109	118	122	591

The depth of water at Stations III. and IV. is much less than at the others, and scarcely reaches to thirty fathoms; therefore, as indicated by the Table given above, fewer hauls were taken at these stations.

As the gatherings were collected at different times of the year, as well as at different stations, they tend to indicate approximately the general distribution of the pelagic crustacea present in Loch Fyne during the four years referred to. The gatherings also exhibit evidence of local variation in the distribution of these organisms, and to some extent seasonal differences are also indicated;* but before this latter result could be satisfactorily dealt with the observations would require to be continued over a longer period.

The nets used were of a uniform size and fineness of mesh, but a few special hauls made off Inveraray, and at Station I. in October 1906, were taken, some of them with a large "mid-water net," and others with a "ring-net."

Pelagic Copepoda formed a large portion of the contents of the varions gatherings, the most common species being *Calanus helgolandicus*, Claus; many of the hauls consisted almost entirely of this species. Other forms were sometimes met with, but they seldom occurred in large numbers. A list of the species observed is given at the end of this paper.

The following is a short description of the quantities and contents of the gatherings collected during the four years at the different stations mentioned above. The quantities are given in cubic centimetres (c.c.'s).† The stations are taken in the order in which they occur in the Table.

STATION I.—LOWER LOCH FYNE. (E. OF BARMORE PENINSULA.)

1905.

The total number of gatherings from this station is about one hundred and four. Forty-nine of these were collected during 1905, and are shortly described below.

FEBRUARY.—Seven gatherings were collected in February. They comprised two horizontal and five vertical hauls. One of the horizontal hauls was collected at the surface, and one was a mid-water gathering; their contents, which measured about 25·5 and 10 c.c.'s respectively, consisted for the most part of *Calanus*. The vertical hauls were from 30, 45, 60, 75, and 90 fathoms. The haul from 30 fathoms measured 2·5 c.c.'s, that from 45 fathoms was badly preserved; the others, like that from 30 fathoms, were small gatherings, and measured respectively 2·5, 2·5, and 1·5 c.c.'s, and consisted for the most part of *Calanus*. The only other organisms observed were a few fish ova (in the surface gathering), a few *Euchæta norvegica*, *Bradyidius armatus*, *Pseudocalanus elongatus*, young *Mysis* sp., Sagitta and *Tomopteris*.

MARCH.—The eight gatherings collected in March included three horizontal hauls—one taken at the surface, one at mid-water, and one near the bottom. The surface and mid-water gatherings measured respectively 5·5 and 6 c.c.'s, and consisted chiefly of *Calanus*, but *Pseudocalanus elongatus* was moderately frequent in the surface gathering, and *Euchæta norvegica* in that from mid-water ; the bottom horizontal haul contained a quantity of mud and was not measured The five vertical hauls collected in March were from 15, 30, 45, and 60 fathoms, and one from near the bottom (about 70 fathoms). All these gatherings were small, and contained only a few *Calanus*, *Pseudocalanus*, *Euchæta*, and one or two other common forms.

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* See pp. 94–96, tables for Stations III. and IV.; compare quantities for May 1905 and 1906 with those for 1907 and 1908 for the same month.

† The quantities of the various gatherings were estimated by my colleague, Dr. Williamson, as explained below, and he has kindly allowed me the use of his notes thereanent. A noted quantity of water was put into a glass measure graduated in centimetres. The tow-net collection was then poured out on to cheese-cloth similar to that of which the tow-nets are made. The mass of Copepoda was then transferred by means of a scapula to the glass measure, and the volume of the water and Copepoda was noted. From that amount the volume of the collection was found by subtracting the original quantity of water. When the Copepoda were on the cheese-cloth a certain amount of the formaline solution in which they were preserved was included in the mass. No attempt was made to remove this, except that, when the collection was a large one, it was gently pressed with the fingers till the excess of fluid ran off.

April.—Eight gatherings, comprising three horizontal and five vertical hauls, were collected in April. The horizontal hauls consisted of a surface, a mid-water (35 fathoms), and a bottom (70 fathoms) gathering. The surface gathering measured only about 1c.c.; the other two were moderately large, and measured 26·5 and 49 c.c.'s respectively. The five vertical hauls were from 15, 30, 44, and 60 fathoms, and one from near the bottom, and measured 2·5, 5·5, 2·5, 2, and 2 c.c.'s respectively. *Calanus* was the most common species in these gatherings, but *Pseudocalanus* and *Centropages hamatus* were moderately frequent, and there were also a few others. The following numbers represent approximately the proportional numbers of the species observed in the gathering from 30 fathoms:—*Calanus* 500, *Centropages hamatus* 150, *Pseudocalanus* 100, *Euchæta* 2, *Acartia clausi* 5, together with a few *Evadne nordmanni*, *Podon leuckarti*, larval Balani, Ascidians, and fish eggs.

May.—Eight gatherings, comprising three horizontal and five vertical hauls, were collected in May. The horizontal hauls consisted of a surface, a mid-water, and a bottom gathering, as in April. The surface catch was a small one, and measured only 2·5 c.c.'s, in which *Calanus* and *Centropages* were about equally common, and constituted the chief part of the haul, but *Acartia clausi*, *Evadne*, and *Podon leuckarti* were also frequent; other forms observed included a few Sagitta, Oikopleura, and fish eggs. The mid-water and bottom hauls measured about 2·5 and 4·5 c.c.'s respectively ; their contents did not differ much from the surface haul just described, except that it contained a few *Euchæta* and *Parapontella brevicornis.* The vertical hauls were from depths similar to those described under April, and measured 3·5, 3, 3, 5, and 7·5 c.c.'s respectively. The species observed in these gatherings did not differ greatly either in proportion or kinds from those mentioned above, except that *Temora longicornis* and *Anomalocera patersoni* occurred in the haul from 15 fathoms, and *Metridia lucens* in that from the deep water.

June.—Five gatherings, all vertical hauls, were collected in June. They were taken at depths similar to those already described, and measured 3, 11·5, 20·5, 25·5, and 55 c.c.'s respectively. The two last hauls consisted almost entirely of *Calanus.* The same organism constituted the largest portion of the other gatherings, but *Centropages hamatus*, *Pseudocalanus elongatus*, and *Acartia clausi* were also present in small numbers.

August.—Five vertical hauls collected in August measured respectively about 1·5, 2·5, 6, 50, and 14 c.c.'s. These measurements indicate a considerable decrease in the number of crustacea when compared with the June collection. These gatherings consisted almost entirely of *Calanus.*

September.—All the gatherings collected in September were vertical hauls. Those from 15, 30, and 45 fathoms were small, and measured only 1, 1, and 2·5 c.c.'s respectively. The haul from 60 fathoms measured 9·5 and that from 75 fathoms 25 c.c.'s. Each of these hauls shows apparently a still further falling off in the number of pelagic crustacea at this station. *Calanus* formed about half of the catch from 15 fathoms, the other half consisting for the most part of *Pseudocalanus* and *Acartia clausi* in about equal numbers. *Calanus* formed about 65 per cent. of the catches from 30 and 45 fathoms, and 75 per cent. of the two from deep water.

1906.

April.—Pelagic crustacea were apparently scarce at the Barmore station in April. Four vertical hauls were collected at 15, 30, 45, and 75 fathoms, but the catches were small. That from 15 fathoms contained about 100 *Calanus*, one or two *Centropages hamatus*, and a few larval Balani, while that from 30 fathoms contained about 200 *Calanus* and about half that number of *Pseudocalanus*. The catch from 45 fathoms differed little from the one just referred to, but though that from 75 fathoms was also small, *Calanus* and *Pseudocalanus* were rather more numerous, and there were also present a few *Centropages hamatus* and *Temora longicornis*, and one or two larval Balani.

June.—The next series of gatherings from this station were collected in June. They were vertical hauls from depths similar to those already mentioned, *i.e.*, 15, 30, 45, and 60 fathoms, and one from near the bottom (80 fathoms). In these gatherings pelagic crustacea were rather more plentiful. The first three hauls measured respectively 3·5, 10·5, and 9·5 c.c.'s, that from 60 fathoms 20 c.c.'s, and the one from 80 fathoms 25 c.c.'s. The contents of the various hauls consisted almost entirely of *Calanus*.

August.—Five gatherings were also collected here in August. The first four did not differ greatly in any way from those just described, but the last one (from 75 fathoms) was considerably larger than that collected in June, and measured 100 c.c.'s. *Calanus* and *Pseudocalanus* were present in about equal numbers in the first four gatherings, but the last one consisted almost entirely of *Calanus*. A few *Euchæta*, *Parapontella brevicornis*, *Rhoda raschi*, and Sagitta were observed in some of the hauls. The first four hauls measured respectively 3, 7·5, 15·5, and 20·5 c.c.'s.

September.—Five hauls were collected in September. The smallest was from 15 fathoms and measured only 1 c.c.; the next two from 30 and 45 fathoms were also small—they each measured 1·5 c.c.'s; those from 60 and 75 fathoms were considerably larger, and measured respectively 15·5 and 70 c.c.'s. The last two gatherings consisted almost entirely of *Calanus*, *Euchæta norvegica*, of which there were a few specimens, being the only other species observed. *Calanus* also formed the chief portion of the other gatherings, but a few specimens of *Anomalocera patersoni* occurred in the gathering from 15 fathoms, while *Pseudocalanus* formed about 2 per cent. and *Acartia clausi* 5 per cent. of those from 30 and 45 fathoms.

October.—The gatherings collected in October were similar to those just described, and the quantity of each catch did not differ to any great extent, so that, apparently, the number and general distribution of the pelagic crustacea remained much the same as it was in September. The gatherings consisted chiefly of *Calanus*, but a few *Euchæta* and *Nyctiphanes norvegicus* occurred in the hauls from 60 and 75 fathoms, and there were also a few Sagitta in some of the gatherings.

1907.

April.—Five vertical hauls were collected in April 1907. They were very small, and the total catch scarcely measured 6 c.c.'s. The contents of the various gatherings consisted for the most part of *Calanus*, but the following species were also represented, though very sparingly, viz.:—*Acartia clausi*, *Anomalocera patersoni*, *Centropages hamatus*, *Euchæta norvegica*, *Pseudocalanus elongatus*, and *Temora longicornis*. A few larval Balani, Sagitta, and fish ova were observed.

May.—The gatherings collected in May, when compared with the April collections, showed a considerable increase in the number of pelagic crustacea at this station; there was also, apparently, a fairly uniform distribution of these organisms at the various depths at which the hauls were made. The gatherings were, as usual, from 15, 30, 45, 60, and 75 fathoms, and measured respectively 27, 17, 23, 29, and 42 c.c.'s. The contents of the several gatherings consisted mainly of *Calanus*, but a few other species were observed, and also some larval Decapoda and Sagitta; these were, however, only sparingly represented.

SEPTEMBER.—The next series of gatherings from this station were collected in September. They consisted almost entirely of *Calanus*, which appeared to be very unevenly distributed. The haul from 15 fathoms measured less than 1 c.c., and that from 30 fathoms only 1·5 c.c.'s, while the other three measured respectively 21, 80, and 170 c.c.'s. These two deep-water hauls are larger than any of the others from this station collected at the same depths.

OCTOBER.—The October gatherings, from 15, 30, and 45 fathoms, were nearly blank, as also were those from 60 and 75 fathoms. They contained only a small number of *Calanus*, a few *Pseudocalanus* and *Acartia*, and one or two other common forms.

1908.

JUNE.—The series of gatherings collected in June 1908 appeared to indicate that the pelagic crustacea at this station were somewhat similar in numbers and distribution to what they were during the same month both in 1905 and 1906, as shown by the gatherings then collected. No doubt certain differences are revealed when the figures given below are compared with those for the years mentioned, but the changes noticed may easily be accounted for by local movements among the pelagic forms referred to. The present gatherings were from 15, 30, 45, 60, and 80 fathoms, and measured respectively 6·5, 10, 11, 22·5, and 41 c.c.'s.

AUGUST.—The August gatherings, compared with those collected in June, showed that in the interval a considerable falling off in the number of pelagic organisms had apparently taken place. The hauls from 15 and 30 fathoms measured each 3·5 c.c.'s, that from 45 fathoms measured 6·5 c.c.'s, and that from 60 fathoms 19 c.c.'s. The bottom gathering measured only 10 c.c.'s.

STATION II. (BETWEEN MAOL DUBH POINT AND KILFINAN BAY).

About one hundred gatherings were collected at this station during the four years. Twenty-nine were collected in 1905, nineteen in 1906, twenty-nine in 1907, and twenty-three in 1908, and are briefly described below.

1905.

JANUARY.—Four vertical hauls were collected in January—one from 15, 30, and 50 fathoms, and one from the bottom. They showed that though pelagic crustacea were apparently scarce towards the surface they were fairly plentiful near the bottom. The gathering from 15 fathoms measured less than 1 c.c., and that from 30 fathoms about 5·5 c.c.'s, while the other two measured respectively 11 and 60 c.c.'s. The four horizontal hauls collected at the same time, though larger in quantity, indicate a somewhat similar distribution of pelagic organisms to that described. A gathering taken at the surface measured 2·5 c.c.'s; others collected at 15 and 45 fathoms and near the bottom measured respectively 120, 162, and 192 c.c.'s.

MARCH.—Pelagic crustacea were apparently very scarce in March.

Two hauls from 45 and 60 fathoms contained only a few *Calanus* and *Euchæta* and one or two *Nyctiphanes.* A third haul from near the bottom yielded a few demersal Copepods and one or two specimens of a small Isopod (*Pseudotanais forcipatus*).

April.—The gatherings collected in April were also small. Vertical hauls from 15, 30, 45, and 68 fathoms measured altogether only about 2 or 3 c.c.'s of pelagic crustacea, consisting chiefly of *Calanus*, but a few other Copepoda were also sparingly represented. A horizontal mid-water gathering gave rather better results, though at the same time showing that pelagic crustacea were still scarce.

May.—Vertical hauls from 15, 30, 45, 60, and 75 fathoms were collected in May, and showed a moderate increase in the number of pelagic crustacea over the April gatherings. They were distributed as follows:—2·25 c.c.'s from 15 fathoms, 4·5 c.c.'s from 30 fathoms, 4 c.c.'s from 45 fathoms, 8 c.c.'s from 60 fathoms, and the same from 70 fathoms. Horizontal hauls were also collected—one at the surface, one near the bottom, and a mid-water haul. The surface gathering measured 5 c.c.'s, that from mid-water 3·5, and that from the bottom 23·5 c.c.'s. The contents of the various hauls consisted for the most part of *Calanus*, but some other species were also represented by a fair number of specimens, *i.e.*, *Acartia clausi*, *Anomalocera patersoni*, *Centropages hamatus*, *Pseudocalanus elongatus* and *Temora longicornis.* A few *Euchæta* were observed in one of the bottom gatherings. Oikopleura were also occasionally noticed and were moderately common in the vertical haul from 30 fathoms.

August.—Vertical hauls from 15, 30, 45, and 60 fathoms were collected in August. The first two measured respectively 1 and 2 c.c.'s, and the others 8 and 12·5 c.c.'s. These gatherings consisted chiefly of *Calanus*, but a few other common forms, including *Euchæta* and Sagitta, were also present.

1906.

June.—Vertical hauls from 15, 30, 45, and 62 fathoms collected in June measured respectively 7, 5·5, 7, and 10·5 c.c.'s. The contents consisted almost entirely of *Calanus*, the only other species noticed, and which were only sparingly represented, being *Pseudocalanus elongatus*, *Metridia lucens*, and *Acartia clausi*, and a few Sagitta.

August.—The gatherings collected in August from 15, 30, 45, 60, and 75 fathoms measured respectively 1, 3·5, 20, 37, and 30 c.c.'s. In the gatherings from 15 and 30 fathoms, *Calanus* was less plentiful than in the others, while *Pseudocalanus*, on the other hand, formed nearly 70 per cent. of the catch. *Centropages hamatus* and *Parapontella brevicornis* were also observed in this sample. The other gatherings consisted almost entirely of *Calanus*, with a few *Euchæta* and *Rhoda raschi.*

September.—The series of gatherings collected in September was similar to that for August, but the catches were much smaller; those from 15 and 30 fathoms measured less than 1 c.c. each. A gathering from 50 fathoms measured 1·5 c.c.'s, while other two from 60 and 75 fathoms measured 2·5 and 20 c.c.'s respectively. These gatherings consisted almost entirely of *Calanus*, but a few *Euchæta* and *Rhoda raschi* occurred in those from 60 and 75 fathoms.

October.—The gatherings collected in October showed pelagic crustacea to be still scarce at this station except near the bottom. Hauls taken at 30 and 45 fathoms measured less than 1 c.c., and consisted of a small number of *Calanus*, *Pseudocalanus*, *Acartia clausi*, and Sagitta, while two others taken at 60 and 75 fathoms measured respectively 3·5 and 23 c.c.'s, and contained, in addition to the usual Copepoda, a number of Schizopods (including *Rhoda raschi* and *Nyctiphanes norvegicus*) and Sagitta.

1907.

April.—The five hauls collected in April 1907 were all of them small; the two largest measured only about 2 c.c.'s each. The scarcity of pelagic crustacea at this time appeared to be general all through the water, as shown by the smallness of the catches. These gatherings consisted for the most part of *Calanus*; a small number of *Pseudocalanus*, *Centropages hamatus*, and Cirriped larvæ, one or two *Nyctiphanes*, Sagitta, and fish ova were also present.

May.—The number of hauls collected in May was similar to the last. They showed that a considerable increase in the number of pelagic crustacea had taken place since the April gatherings were collected. All the catches were of moderate size, especially those taken at 45 and 60 fathoms, which measured respectively 12 and 17 c.c.'s. The other three gatherings from 15, 30, and 75 fathoms were smaller, and measured 8, 7, and 9 c.c.'s respectively. The contents of the several gatherings consisted chiefly of *Calanus*, other forms being very scarce.

June.—Moderately large gatherings were obtained in all the five hauls collected in June, but at this time pelagic crustacea were apparently more plentiful at 15 fathoms than they were lower down, as shown by the results of the different hauls, the measurements of which are as follow: —The gathering from 15 fathoms measured 80 c.c.'s, while the others from 30, 45, and 60 fathoms and the bottom measured respectively 55, 15, 22, and 25 c.c.'s.

September.—The four vertical hauls collected at this station in September exhibited a decided falling off in the numbers of pelagic crustacea when compared with those collected in June. The hauls from 15, 30, and 45 fathoms were small, and measured respectively only 1, 1·5, and 4·5 c.c.'s, while that from 65 fathoms measured 21 c.c.'s; this gathering consisted almost entirely of *Calanus*, but in those from 15 and 30 fathoms a few other species were also sparingly observed, including *Pseudocalanus*, *Centropages hamatus*, *Temora longicornis*, and *Acartia clausi*.

October.—Five vertical hauls were collected in October. Those from 15, 30, and 45 fathoms were very small, so also was the gathering from 60 fathoms. The gathering from 75 fathoms was considerably larger than the others and measured 40 c.c.'s, and though *Calanus* formed the largest part of it, a small number of *Pseudocalanus*, *Acartia*, *Nyctiphanes*, and *Rhoda raschi* were also observed. The other gatherings consisted almost entirely of *Calanus*, but among them were a few Sagitta.

December.—The gatherings collected in December were, with the exception of the haul from 15 fathoms, considerably larger than those collected in October. The gathering from 15 fathoms measured 4 c.c.'s, but those from 30, 45, and 55 fathoms measured respectively 25, 82, and 115 c.c.'s. These gatherings consisted almost entirely of *Calanus*, except that a few *Euchœta* and one or two *Nyctiphanes* were present in the haul from 55 fathoms

1908.

March.—Vertical hauls from 30, 45 and 60 fathoms collected in March 1908 measured 2, 1, and 1·5 c.c.'s respectively. *Calanus* was the only species observed in the first two, but in the other a few *Nyctiphanes* were also noticed, as well as one or two Sagitta.

May.—The four gatherings collected in May gave fairly good results, and indicated the presence of a considerable abundance of pelagic crustacea. The hauls were from 15, 30, 45, and 60 fathoms, and measured respectively 10, 9, 31, and 17 c.c.'s. *Calanus* appeared to be the only species represented in these gatherings, with the exception of a few *Centropages hamatus* and Sagitta.

June.—Five hauls were collected in June at the usual depths; they showed that pelagic crustacea were still fairly common, but scarcely so plentiful as in the previous month. The gatherings measured respectively 5·5, 9·5, 11·5, 14·5, and 15·5 c.c.'s, and indicated a fairly uniform distribution of the organisms mentioned.

August.—The gatherings (four in number) collected in August, compared with those for May and June, showed a large falling off in the numbers of pelagic crustacea all through the water, the quantity of each of the four hauls being respectively 2·5, 2, 3·5, and 6·5 c.c.'s.

December.—The gatherings collected in December comprised vertical hauls from 15, 30, 45, 60, and 70 fathoms, and their contents measured respectively 5, 11, 47, 63, and 40 c.c.'s. They show a considerable increase over the August gatherings. In these gatherings *Calanus* was the only species observed.

Station III., Upper Loch Fyne (fully 1 Mile S.E. from North Kames).

The number of gatherings collected at this station was sixty-eight. Of these, thirty-one were collected in 1905, ten in 1906, eleven in 1907, and sixteen in 1908, and are briefly described below.

1905.

January.—Two gatherings collected in January—one from 15 fathoms and one from the bottom—were very small; that from the bottom measured only 2·5 c.c.'s, the contents consisting entirely of *Calanus*.

March.—The gatherings collected in March comprised three horizontal and three vertical hauls. The horizontal gatherings were collected at the surface, mid-water, and bottom, and measured respectively 2, 4·5, and ·75 c.c.'s. Two of the vertical hauls were from the bottom and the other from 15 fathoms; they were small gatherings, and consisted for the most part of *Calanus*; but a few other forms also occurred, including *Acartia clausi*, *Diaixis pygmœus*, Decapod larvæ, and fish ova. The horizontal consisted chiefly of *Calanus*, with a few *Pseudocalanus*, *Centropages hamatus*, *Acartia clausi*, *Evadne nordmanni*, larval and young crustacea, and Sagitta.

April.—Six gatherings collected in April comprised three horizontal and three vertical hauls. The horizontal hauls were from the surface, mid-water, and bottom, and measured about 3, 1·5, and 16·5 c.c.'s respectively. One of the vertical hauls was from 15 fathoms and the other two from the bottom (28 to 30 fathoms). The first measured 2·5 c.c.'s, and the other two together about 8·5 c.c.'s (3·5 and 5 c.c.'s). Though *Calanus* was the most common species, *Centropages hamatus* was also frequent, so also was *Pseudocalanus*. In one of the bottom gatherings, for every 100 *Calanus* there were about 35 *Centropages* and 15 *Pseudocalanus*, a few *Acartia clausi*, *Euchœta*, *Evadne nordmanni*, Decapod larvæ and Sagitta and a few fish ova.

May.—The gatherings collected in May comprised one surface and three vertical hauls. They were small gatherings; the total catch measured scarcely 4 c.c.'s, of which *Pseudocalanus* formed about 4 per cent., *Centropages* 10 per cent., and *Calanus* only about 8 per cent. *Temora longicornis*, *Acartia clausi*, and *Podon leuckarti* were also sparingly represented. Oikopleura was frequent in the surface gathering, but not in the others.

June.—Two gatherings collected in June included a surface haul and a vertical haul from the bottom. They were both small and measured about 1·5 c.c.'s each. *Centropages* and *Pseudocalanus* were about equally numerous, and together formed about 70 per cent. of the entire catch.

Calanus, on the other hand, formed only about 25 per cent.; there were also a few *Temora longicornis* and some larval forms.

August.—Vertical hauls from 10, 15, and 25 fathoms were collected in August; all the three gatherings were small. About half of the total catch consisted of *Calanus* and the remainder of *Pseudocalanus*, *Centropages hamatus*, and *Acartia clausi*, but a few *Evadne*, *Podon leuckarti*, and *Parapontella brevicornis* were also observed, along with a few larval forms.

September.—Two vertical hauls, one from 15 and the other from 25 fathoms, were collected in September. The total catch measured only about 1·5 c.c.'s. The gatherings were about equal, and consisted almost entirely of *Calanus*, a few *Pseudocalanus* and *Acartia clausi* being the only other organisms observed.

October.—Two gatherings collected in October were also very small. They were vertical hauls, one from 15 fathoms and the other from the bottom, and consisted almost entirely of *Calanus*.

1906.

April.—Vertical hauls from 15 and 26 fathoms were collected in April 1906. They were both small, and together measured only about 4 c.c's. The contents of the first consisted chiefly of *Calanus*, with a few *Pseudocalanus*, *Centropages hamatus*, and a small number of fish ova. In the second gathering, *Pseudocalanus* was rather more frequent and formed about a third of the catch.

June.—Two gatherings collected in June 1906, comprising a vertical haul from 15 fathoms, and one from the bottom (about 25 fathoms), measured 3·5 and 4·5 c.c.'s respectively, and consisted almost entirely of *Calanus*.

August.—Two vertical hauls similar to the last were collected in August; one measured 3 and the other 2·5 c.c.'s. In the first *Calanus* formed fully 50 per cent. of the catch, *Pseudocalanus* 25 per cent., and *Centropages* about 20 per cent. A few specimens of *Parapontella brevicornis* and *Thaumaleus rigidus* were observed in this haul. In the bottom gathering *Calanus*, *Pseudocalanus*, and *Centropages* were about equally numerous. *Acartia clausi* was also observed, but only in small numbers.

September.—The two vertical hauls collected in September were very small, and together measured only about 2 c.c.'s. They consisted for the most part of *Calanus* and *Pseudocalanus* in nearly equal numbers. A few *Centropages hamatus* were also present in the bottom gathering.

October.—Vertical hauls from 15 and 25 fathoms were also collected in October; they were both small gatherings. In the first *Calanus* and *Acartia clausi* were about equally numerous, but a few specimens of *Anomalocera* and Decapod larvæ were also noticed. The second consisted for the most part of *Calanus*, *Pseudocalanus*, and *Acartia clausi*, together with a few *Centropages hamatus*. There were also a small number of Sagitta and Decapod larvæ present in this gathering.

1907.

April.—Two vertical hauls, one from 15 and the other from 29 fathoms, were collected in April 1907. Both gatherings were very small, and consisted chiefly of *Calanus*, mixed up with which were a few other common forms.

May.—The two vertical hauls collected in May, the one from 15 and the other from 27 fathoms, showed a marked difference from the previous gatherings in the larger amount of pelagic crustacea captured. But the two samples, which measured respectively 11 and 13 c.c.'s, consisted almost entirely of *Calanus*, no other species being noticed.

June.—The two hauls collected in June were also moderately large, but the gathering from 15 fathoms was rather smaller, and that from the bottom somewhat larger than those collected in May.

September.—The gatherings collected in September were both small and measured respectively 1·5 and 2 c.c.'s. They both consisted for the most part of *Calanus*, together with a few *Pseudocalanus*, *Centropages hamatus*, and *Acartia clausi*. A few *Evadne nordmanni* were also observed.

October.—A vertical haul from near the bottom, collected in October, yielded only a few *Calanus*, one or two *Anomalocera patersoni*, and a few Sagitta.

December.—A vertical haul from 15 fathoms, collected in December, contained only a few *Calanus*. One from 22 fathoms was also small, though slightly larger than the other. Pelagic crustacea were apparently very scarce at this station when these gatherings were collected.

1908.

February.—Two vertical hauls, one from 15 fathoms, the other from the bottom, were collected in February 1908. They each measured about 3·5 c.c.'s, and consisted almost entirely of *Calanus*, a few fish ova being also present.

March.—A haul from 15 fathoms and one from 25 fathoms, collected in March, measured respectively 2 and 3 c.c.'s. Both gatherings consisted almost entirely of *Calanus*, a few larval crustacea and fish ova being also observed.

May.—The gatherings collected in May showed a considerable increase in the number of pelagic crustacea. The hauls were vertical, from 15 and 25 fathoms, and measured respectively about 7·5 and 9·5 c.c.'s. They consisted chiefly of *Calanus*. Some other species sparingly represented included *Anomalocera*, *Centropages hamatus*, *Parapontella*, and *Podon leuckarti*. A few young Decapods and Schizopods were also noticed.

June.—The June gatherings were both small, especially that from 15 fathoms, which measured only 1·5 c.c.'s; the bottom haul was rather larger and measured about 5 c.c.'s. These samples, compared with those collected in May, seemed to indicate a falling off in the numbers of pelagic crustacea.

August.—The gatherings collected in August were even smaller than those collected in June, and though that from the bottom was slightly larger than the other, the combined catch measured less than 3 c.c.'s, and showed a further decrease in the number of pelagic crustacea.

September and November.—The gatherings collected in September and November were all blank or nearly so. The gathering from 30 fathoms collected in September contained only a few *Calanus* and *Acartia clausi*, scarcely a dozen specimens altogether, and the others were equally unproductive.

December.—The December gatherings yielded rather better results than those just referred to. The haul from 15 fathoms collected at this time measured 8 c.c.'s, and consisted entirely of *Calanus*. The other, from 30 fathoms, measured 11 c.c.'s; its contents differed from the gathering from 15 fathoms in that it contained a few *Euchæta* and Sagitta in addition to the *Calanus*.

Station IV. (about ¾-mile S.E. from Kilmichael Beg).

Thirty gatherings (including horizontal) were collected at this station in 1905, ten in 1906, twelve in 1907, and nine in 1908, and are briefly described below.

1905.

February.—Four gatherings, comprising two horizontal and two vertical hauls, were collected at this station in February 1905. One of the horizontal hauls was taken at the surface and the other at the bottom, and measured respectively 25 and 14 c.c.'s. Both gatherings consisted for the most part of *Calanus*, but in the surface hauls the following species were also met with:—*Euchæta norvegica*, *Pseudocalanus elongatus*, and *Oithona similis*; a few Decapod larvæ and fish ova also occurred. The species observed in the bottom haul included *Bradyidius armatus*, *Euchæta*, *Acartia clausi*, *Ephimedia obesa*, *Epimeria cornigera*, *Paratylus bispinosus*, *Nyctiphanes*, and *Mysis* sp.

The vertical haul from 15 fathoms consisted almost entirely of *Calanus*, and that from 28 fathoms was somewhat the same, except that a few species similar to those already referred to were also observed. The two vertical hauls were about equal, and each measured 2·5 c.c.'s. The quantities of these gatherings, both the horizontal and the vertical hauls, seemed to indicate that pelagic crustacea were rather more plentiful in the upper strata than they were near the bottom.

March.—Seven gatherings were collected in March; three of them were horizontal and four were vertical hauls. The horizontal hauls included a surface, a mid-water, and a bottom gathering, and measured respectively 6, 10, and 30 c.c.'s, and they consisted almost entirely of *Calanus*. The vertical hauls comprised two from 15 fathoms and two from the bottom. The first two were very small; the other two, though slightly larger, were also small, and together measured less than 2 c.c.'s, and consisted chiefly of *Calanus*. A small number of *Pseudocalanus* were also observed in the bottom gatherings.

April.—Three horizontal and two vertical hauls were collected at this station in April. The horizontals included a surface, mid-water, and bottom gathering, and measured respectively 5, 17, and 3 c.c.'s. The contents of the first two consisted chiefly of *Calanus*, but *Centropages* also occurred in both and formed about 5 per cent. of the combined catch. One or two other common forms were also observed in these hauls. In the bottom haul *Calanus* and *Centropages* were equally numerous, and together formed about 70 per cent. of the gathering, and *Pseudocalanus* about 15 per cent.

Both the vertical hauls were small, and only measured 1·5 and 1 c.c. respectively. The contents of these gatherings were similar in variety and proportion to that of the horizontal bottom haul.

May.—The gatherings collected at this station in May comprised two horizontal and four vertical hauls. The horizontal gatherings were both small; one was from the surface and the other from the bottom. The vertical hauls included two from 15 fathoms and two from the bottom; all the catches were small, and did not differ greatly as to quantity. The total catch did not exceed 4 c.c.'s. The gatherings consisted chiefly of *Calanus*; other species sparingly met with included *Pseudocalanus*, *Centropages*, *Parapontella*, *Temora*, *Acartia clausi*, *Evadne*, and *Podon leuckarti*.

June.—Pelagic crustacea appeared to be scarce at this station in June. Two vertical hauls, one from 15 fathoms and one from 25 fathoms, measured less than ·5 c.c. each. The most common species was *Centropages hamatus*, but *Calanus* and *Pseudocalanus* in about equal numbers also formed a considerable portion of the catch. A few *Temora*, *Acartia clausi*, Sagitta, and Decapod larvæ were also observed.

August.—Pelagic crustacea, though still apparently scarce, were rather more numerous than in June. The variety and proportional numbers of the species taken in the two hauls from 15 and 28 fathoms were, however, somewhat similar to those obtained in the June gatherings.

SEPTEMBER.—Two vertical hauls, one from 15 and the other from 25 fathoms, collected in September, measured about 1·5 c.c.'s each, and consisted chiefly of *Calanus*, and were otherwise similar to those previously described.

OCTOBER.—The two gatherings collected in October under conditions similar to the last measured less than 1 c.c. each, and contained only a small number of *Calanus*, *Pseudocalanus*, *Acartia*, and Sagitta.

1906.

APRIL.—The two vertical hauls collected in April 1906 were small and contained a small number of *Calanus*, along with a few other common species similar to those already recorded.

JUNE.—The gatherings collected in June showed a moderate increase in the number of pelagic crustacea at this station. The gathering from 15 fathoms measured about 3 c.c.'s, and that from 25 fathoms 6 c.c.'s. The first gathering consisted almost entirely of *Calanus*, and the same species formed about 75 per cent. of the other. A few common forms similar to those already recorded were in the bottom gathering.

AUGUST.—The August gatherings were smaller than those collected in June. In that from 15 fathoms *Calanus*, *Pseudocalanus*, and *Centropages hamatus* were each equally numerous, and formed about 25 per cent. of the haul. *Temora* formed about 10 per cent., and *Acartia clausi* nearly the same. A few *Anomalocera* and Decapod larvæ were also observed. The bottom gathering contained a larger proportion of *Calanus*, but otherwise it was similar to the last.

SEPTEMBER AND OCTOBER.—The gatherings collected in September and October were very small, pelagic crustacea being apparently scarce during these months. The species represented were similar to those already described from this station.

1907.

APRIL.—The vertical hauls from 15 and 28 fathoms collected in April 1907 measured respectively 1·3 and 3·5 c.c.'s, and consisted for the most part of *Calanus*.

MAY.—Pelagic crustacea, especially *Calanus*, were apparently fairly plentiful at this station in May 1907. A vertical haul from 15 fathoms measured 10 and one from 29 fathoms 11 c.c.'s respectively; both consisted chiefly of *Calanus*, but in the bottom gathering a number of *Pseudocalanus* and *Centropages hamatus* were also present, the one forming about 5 per cent. and the other 10 per cent. of the catch.

JUNE—Two gatherings were collected in June, both of which were small. That from 15 fathoms measured only 1 c.c., while the other from 26 fathoms measured 3 c.c.'s. Both gatherings consisted chiefly of *Calanus*.

SEPTEMBER.—Gatherings from 15 and 28 fathoms were collected in September; they each measured about 2·5 c.c.'s, and, like the June gatherings, consisted for the most part of *Calanus*.

OCTOBER AND DECEMBER.—Very small gatherings were obtained at this station both in October and December, and in each case *Calanus* formed the largest portion of their contents. A few other species occurred very sparingly, such as *Bradyidius armatus* and young *Euchæta norvegica*.

1908.

MAY.—Pelagic crustacea were apparently fairly plentiful at this station in May 1908, obviously due to a large increase in the number of *Calanus*

The two vertical hauls collected at this time, one from 15 and the other from 25 fathoms, measured respectively 13 and 16 c.c.'s. The contents of both gatherings consisted chiefly of the species mentioned. *Anomalocera patersoni* and *Centropages hamatus* were also present, but they formed only about 1 per cent. of the whole catch. A small number of *Evadne nordmanni*, young Decapoda, and Schizopoda were also observed.

AUGUST AND SEPTEMBER.—The samples collected in August and September were very small, and showed a considerable decrease in the number of pelagic crustacea at this station. The contents of the various gatherings consisted almost entirely of *Calanus*.

NOVEMBER AND DECEMBER.—There was a somewhat similar absence of pelagic crustacea at this station when visited in November, but in December a distinct, though not very extensive, increase appeared to have taken place, especially in the deeper water. A vertical haul from 28 fathoms collected in December measured 2·5 c.c.'s, and consisted chiefly of *Calanus*.

STATION V. (MIDWAY BETWEEN PENNIMORE AND NEWTON BAY).

Forty-three gatherings were collected at this station in 1905, twenty-one in 1906, twenty-one in 1907, and thirty in 1908, and are briefly described below.

1905.

JANUARY.—The gatherings collected at this station in January 1905 comprised three horizontal and four vertical hauls. The horizontal gatherings collected at the surface and at 15 and 30 fathoms were all moderately large. The surface gathering measured 152 c.c.'s, and consisted almost entirely of *Calanus*. One or two other species, including *Pseudocalanus* and *Acartia clausi*, were also noticed, but they occurred very sparingly. The other two gatherings from 15 and 30 fathoms measured respectively 60 and 43 c.c.'s. The vertical hauls were from 15, 30, 45, and 59 fathoms, and measured respectively 12, 24·5, 30, and 35 c.c.'s. *Calanus* formed the largest portion of the contents of these hauls, and the quantities captured showed them to be fairly plentiful all through the water.

MARCH.—The gatherings collected in March showed that *Calanus* were still fairly abundant and more or less evenly distributed at the various depths represented by the different hauls. The four vertical hauls collected at this time were from 15, 30, 45, and 59 fathoms, and measured 18, 19, 26, and 25 c.c.'s respectively. In the haul from 59 fathoms a few *Nyctiphanes* were observed, but otherwise the contents of the different gatherings appeared to consist entirely of *Calanus*.

APRIL.—Five of the gatherings collected in April were horizontal hauls and four were vertical. One of the horizontal hauls was taken at the surface, one at 15, 30, and 45 fathoms, and one near the bottom. The surface gathering was comparatively small, but the next three were large. They measured respectively 5·5, 110, 87, and 65 c.c.'s; their contents consisted almost entirely of *Calanus*, the only other species observed being a few *Pseudocalanus*, *Centropages hamatus*, *Acartia clausi*, and a small number of Decapod larvæ. The bottom gathering contained a quantity of mud, mixed up with which were several Molluscan shells, chiefly Lamellibranchs and the undernoted crustacea—*Leptognathia brevimana*, *Harpinia pectinata*, *Campylaspis costata*, and a few *Calanus*.

The vertical hauls were from 15, 30, 45, and 60 fathoms, and measured respectively 5, 13, 19, and 22·5 c.c.'s. The contents of these gatherings did not differ much from the others, except that in the haul from 60 fathoms there were a small number of *Nyctiphanes, Rhoda raschi*, and Sagitta.

May.—Three of the gatherings collected in May were horizontal and four were vertical hauls. The horizontal hauls included one from surface, one from mid-water, and one from the bottom. The surface and bottom hauls were both considerably larger than the other, and measured respectively 165 and 225 c.c.'s, while the mid-water gathering measured only 75 c.c.'s. The surface and mid-water hauls consisted almost entirely of *Calanus*. In the bottom haul, which was also mainly composed of *Calanus*, the following other species were observed :—*Pandalus montagui, Hippolyte securifrons, Caridion gordoni, Mysis lamornæ, Janira maculosa, Stegocephaloides christianiensis*, and a few *Pseudocalanus* and *Centropages*, The two vertical hauls from 15 fathoms were nearly alike, and together measured about 8 c.c.'s. About three-fourths of their contents consisted of *Calanus*, the remainder being composed of *Pseudocalanus* and *Centropages hamatus*. Two gatherings from 30 fathoms differed considerably in quantity—the one measured 5 and the other 10·5 c.c.'s—and, while the larger consisted almost entirely of *Calanus*, only about a third of the contents of the smaller belonged to that species, the other two-thirds being made up of *Pseudocalanus* (chiefly), *Centropages*, and one or two other common forms. The gathering from 45 fathoms measured about 5·5 c.c.'s, and rather more than half of the contents consisted of *Calanus*, and the remainder of *Pseudocalanus* and *Centropages*.

August.—A vertical haul from 15 fathoms, which measured 1·5 c.c.'s, consisted chiefly of *Calanus*, but *Centropages hamatus* and *typicus* were also observed, the first being fairly numerous; there were also a few *Pseudocalanus* and *Acartia clausi*. Two other hauls from 30 and 45 fathoms measured respectively 3·5 and 3 c.c.'s. Both consisted mainly of *Calanus*, with which a few other other species were sparingly represented, such as *Pseudocalanus, Centropages hamatus, Euchæta, Bradyidius armatus, Temora, Acartia*, and *Oithona similis*, and a small number of Decapod and Isopod larvæ.

September.—Four vertical hauls collected in September were from 15, 30, 45, and 60 fathoms, and measured respectively 1·5, 2, 4, and 15·5 c.c.'s. Besides *Calanus*, of which these hauls chiefly consisted, the following other species were sparingly represented, viz.:—*Pseudocalanus, Bradyidius, Euchæta, Acartia clausi, Rhoda raschi*, and a small number of Sagitta.

October.—The gatherings collected in October comprised vertical hauls from 15, 30, 45, and 59 fathoms. These gatherings were smaller than those collected in September, and measured respectively 1, 1, 3, and 7 c.c.'s. The deep-water gathering, which, like the others, consisted mainly of *Calanus*, contained also a small number of other forms, including *Nyctiphanes, Rhoda raschi*, and Sagitta.

1906.

April.—Vertical hauls from 15, 30, 45, and 60 fathoms collected in April 1906, measured respectively 7, 5, 16, and 12 c.c.'s. The gatherings consisted chiefly of *Calanus*, but one or two other species were observed, though only in small numbers.

June.—The gatherings from this station collected in June comprised vertical hauls at 15, 30, 45, and 55 fathoms. These gatherings measured respectively 7·5, 8·5, 13·5, and 17 c.c.'s. *Calanus* formed about three-fourths of the total catch, and *Pseudocalanus* nearly one-fourth. A few *Centropages, Acartia*, and Sagitta were also observed.

August.—The gatherings, three in number, collected in August were from 15, 30, and 45 fathoms. They were moderately large, especially the last one, and measured respectively 11, 5·5, and 67 c.c.'s. The first consisted of *Calanus* and *Pseudocalanus* in about equal numbers; in the second *Calanus* formed about 50 per cent., *Pseudocalanus* and *Centropages hamatus*, which were nearly equal, formed together about 36 per cent., and *Acartia clausi* 14 per cent. The third haul consisted almost entirely of *Calanus*, but a small number of *Euchæta* (about 1 per cent.), and about a dozen specimens of *Rhoda raschi* and one or two *Nyctiphanes*, were also observed.

September.—Vertical hauls from 15, 30, 45, and 60 fathoms were collected in September, and measured respectively 3·5, 4, 5, and 24 c.c.'s. These gatherings, which were similar to those previously described, consisted for the most part of *Calanus*.

October.—The October gatherings were smaller than those just described. The hauls from 15 and 30 fathoms measured only 1 and 1·5 c.c.'s respectively. The others were larger, and measured, the one 5 and that from deep water 16 c.c.'s. The contents of the various hauls resembled generally those described for August.

Besides the four vertical hauls just referred to, other two horizontal gatherings were collected, one from 20 fathoms and the second from between 40 and 50 fathoms. Both of these gatherings contained a large quantity of pelagic crustacea, comprising *Calanus*, *Euchæta norvegica*, *Rhoda raschi*, and *Nyctiphanes*, this last species being abundant in the deep-water gathering, the contents of which nearly filled a large drop-jar.

1907.

April.—The only gathering from this station examined in April 1907 was from deep water, 55 to 60 fathoms, and measured 70 c.c.'s. It consisted almost entirely of *Calanus*.

May.—The gatherings collected in May 1907 were from 15, 30, 45, and 58 fathoms, and measured respectively 17, 18, 15, and 21 c.c.'s. Besides *Calanus*, which formed the largest portion of the various gatherings, there were also a fairly large number of one or two other common species. *Centropages hamatus*, for example, formed fully 5 per cent. of the haul from 15 fathoms, and about 15 per cent. of the one from 30 fathoms, and it was also represented, though somewhat sparingly, in the gathering from deep water. *Pseudocalanus* formed about 5 per cent. of the gathering from both 30 and 45 fathoms. The same species, along with *Nyctiphanes* and Sagitta, occurred also in the gathering from 58 fathoms.

June.—Moderately large hauls were also obtained in June, especially from 30 fathoms downwards. The gathering from 15 fathoms was the smallest, and measured 6 c.c.'s, but the others measured respectively 13, 15, and 15 c.c.'s. The contents of these gatherings consisted for the most part of *Calanus*.

September.—The gatherings collected in September were also moderately large, and measured respectively 9, 22, 19·5, and 90 c.c.'s. Their contents were similar to those of the June gatherings.

October.—A considerable falling off in the numbers of pelagic crustacea appears to have taken place since the previous visit to this station. The gatherings collected in October were small, especially that from 15 fathoms, which measured only 1·25 c.c.'s; the others, which were rather larger, measured respectively 6, 9·5, and 19 c.c.'s.

December.—A still further decrease was shown by the gatherings collected in December. These, with the exception of one from the deep water, only contained a small number of *Calanus* and one or two other common forms. The deep-water gathering measured 13 c.c.'s.

1908.

FEBRUARY.—The gatherings collected in February 1908 were moderately large, and measured respectively 9, 20, 31·5, and 55 c.c.'s. The contents of the first three consisted entirely of *Calanus*, with the exception of a few fish ova which occurred in the one from 30 fathoms. The same species also constituted the largest portion of the deep-water haul, but in this gathering a few *Rhoda raschi*, *Leptomysis gracilis*, and a small number of Sagitta were also present.

MARCH.—Gatherings from 15, 30, and 45 fathoms collected in March measured respectively 16, 20, and 26 c.c.'s. In these gatherings *Calanus* was almost the only species observed. When compared with the February gatherings, those for March show a slight decrease in the quantity of crustacea captured.

MAY.—The gatherings collected in May, like those just described, consisted almost entirely of *Calanus*, which appeared to be still fairly plentiful at this station. These gatherings, taken in the same order as before, measured respectively 14, 35, 42, and 40 c.c.'s.

JUNE.—The June gatherings were considerably smaller than those collected during the previous month, but their contents were somewhat similar. They measured respectively 3, 3·5, 6, and 12 c.c.'s.

AUGUST.—The gatherings—all vertical hauls like the others—collected in August, were large, and showed that *Calanus*, of which their contents chiefly consisted, were fairly abundant. The measurements of the various hauls, stated in the usual order, are as follow :—That from 15 fathoms measured 5·5 c.c.'s, that from 30 fathoms 18·5 c.c.'s, that from 45 fathoms 25 c.c.'s, and the bottom haul 45 c.c.'s.

SEPTEMBER.—The four September gatherings were small. The one from 15 fathoms contained about ninety *Calanus* and five or six *Acartia clausi*; that from 30 fathoms contained 364 *Calanus*, three or four *Pseudocalanus*, and *Acartia*, while the other two from 45 and 60 fathoms measured respectively 2 and 15·5 c.c.'s, and consisted entirely of *Calanus*. A few Sagitta were observed in the gathering from 30 fathoms.

NOVEMBER.—Pelagic crustacea were apparently very scarce at this station in November. Three gatherings from 15, 30, and 45 fathoms contained only a small number of *Calanus* and a few other common forms.

DECEMBER.—The December gatherings showed a slight increase in the number of pelagic crustacea, especially in those from 45 and 60 fathoms. These gatherings, stated in the usual order, measured respectively sm. 1, 9, 33·5 c.c.'s. *Calanus* formed the chief portion of their contents, but in the bottom gathering *Rhoda raschi* formed about 10 per cent. of the catch, which also contained a few *Euchæta* and Sagitta.

STATION VI. (OFF DOUGLAS WATER, AND DISTANT N. BY E. FROM STRACHUR 1 MILE).

About one hundred and forty-three gatherings have been collected at this station during the four years. Sixty of these were collected in 1905, twenty-five in 1906, twenty-four in 1907, and thirty-four in 1908. They are shortly described below.

1905.

JANUARY.—Eight gatherings were collected in January 1905. Three of these were horizontal and five were vertical hauls. One of the horizontal gatherings was from 15 fathoms and two from near the bottom. The first, which was comparatively small, measured 16 c.c.'s, but the other two were large and measured respectively 250 and 125 c.c.'s. The vertical hauls were from 15, 30, 46, and 60 fathoms, and one from the bottom, and measured respectively 11·5, 17, 20, 40, and 45 c.c.'s. All the gatherings, both horizontal and vertical, consisted for the most part of *Calanus,* but a number of *Euchæta norvegica* occurred in those from the deep water.

March.—The three horizontal gatherings collected in March were from the surface, mid-water, and bottom. The first was nearly blank and contained only a few *Calanus* and fish eggs. The other two, which were also comparatively small, measured about 14 and 20 c.c.'s respectively. The mid-water gathering consisted for the most part of *Calanus*, but in that from the bottom *Euchæta* were nearly as numerous as the *Calanus*. *Nyctiphanes* was also sparingly represented, as was also the somewhat rare *Campylaspis rubicunda*.

The vertical hauls were taken at intervals of about 15 fathoms, as in January, but on this occasion the hauls were duplicated, two being made at each interval. They were small gatherings, and ranged from less than 1 to 3 c.c.'s. Their contents consisted for the most part of *Calanus*.

April.—Eleven gatherings collected at this station in April yielded some interesting results. A horizontal haul taken at the surface measured only about 3 c.c.'s; one taken at about three fathoms below the surface measured 325 c.c.'s, and, like the other, consisted almost entirely of *Calanus*. The other hauls from 18, 33, 48, and 75 fathoms measured respectively 60, 3, 5·5, and 16·5 c.c.'s. The result of these hauls showed that *Calanus* was in much greater abundance near the surface than in the deep water.

The vertical hauls were taken at the same intervals as before, the last being from 75 fathoms. Their contents, which measured respectively 5·5, 4, 9, 4, and 4 c.c 's, were similar to the hauls collected horizontally. The other species observed included *Pseudocalanus*, *Centropages hamatus*, *Acartia clausi*, and *Euchæta norvegica*, but these occurred only in small numbers.

May.—Three horizontal and four vertical hauls were collected in May. The first three included a surface, mid-water, and bottom gathering, and measured respectively 15, 24, and 60 c.c.'s. The vertical hauls were from 15, 30, 45, and 74 fathoms, and measured respectively 9, 9·5, 12, and 42 c.c.'s. These hauls show a gradual increase in the quantity of pelagic crustacea from the surface downwards. The contents of the different gatherings, like those collected in April, consisted chiefly of *Calanus*, and were otherwise similar to them.

June.—The gatherings collected in June comprised three horizontal and five vertical hauls. The surface gathering was very small and measured only 1 c.c., but the other horizontal gatherings from mid water and bottom contained a moderate quantity of pelagic crustacea, and measured respectively about 50 and 75 c.c.'s. The vertical hauls were comparatively small; they measured respectively 4·5, 7, 12, 9·5, and 14·5 c.c.'s, and consisted, like the others, almost entirely of *Calanus*.

August.—Vertical hauls from 15, 30, 45, and 60 fathoms were collected in August, and measured respectively 3·5, 5·5, 11·5, and 22·5 c.c.'s. *Calanus* was almost the only species observed in these gatherings.

September.—The gatherings collected in September were also all vertical hauls. One was taken at 15 and 30 fathoms, two at 45 fathoms, and one at 60 and another at 75 fathoms. The gatherings from 15 and 30 fathoms measured respectively 4·5, 5 c.c.'s, one of the gatherings from 45 fathoms 4·5 and the other 9 c.c.'s, while those from 60 and 75 fathoms measured respectively 75 and 125 c.c.'s. All these gatherings consisted chiefly of *Calanus*. Some other species, including *Pseudocalanus elongatus*, *Bradyidius armatus*, *Euchæta norvegica*, *Acartia clausi*, *Rhoda raschi*, *Nyctiphanes*, and Sagitta were observed, but they occurred very sparingly.

October.—Five vertical hauls were collected in October. The first three gatherings were very small, and measured respectively 1, 1, and 1·5 c.c.'s, while that from 60 fathoms measured 25 c.c.'s, and the last from 70 fathoms, 170 c.c.'s. These gatherings showed that pelagic crustacea, though apparently scarce from 15 down to 45 fathoms, were fairly abundant near the bottom. The contents of the different hauls consisted for the most part of *Calanus*, and were otherwise similar to those collected in September.

1906.

The gatherings collected in 1906 numbered 25. Five were collected in April and June, and the same number in August, September, and October. They were all vertical hauls, from 15, 30, 45, and 60 fathoms, and one from the bottom.

April.—The gatherings collected in April seemed to indicate that pelagic crustacea, though not very plentiful, were distributed more or less uniformly throughout the water. The hauls measured respectively 5, 5, 7, 11·5, and 8 c.c.'s, showing an average of about 7·3 c.c.'s for each. The contents of the different hauls consisted as usual for the most part of *Calanus*, but a few other species were also observed, comprising *Pseudocalanus*, *Euchæta* and *Acartia clausi*, three or four *Nyctiphanes*, and a small number of Sagitta.

June.—The distribution of the pelagic crustacea as shown by the June gatherings still continued fairly uniform, but there was apparently a considerable increase, especially in the number of *Calanus*, the average for the five hauls being about four times the average for April. The gatherings collected in June measured respectively 25, 22·5, 24, 35, and 40 c.c.'s. There was a slight increase in the number of *Euchæta* present in the bottom gathering, but otherwise the contents of the various hauls were similar to those collected in April.

August.—The gatherings collected in August showed that a considerable falling off in the number of pelagic crustacea had taken place since the June gatherings were collected, and that their distribution was much less uniform. The hauls from 15 and 30 fathoms were similar in quantity, and measured only 3·5 c.c.'s each, those from 45 and 60 fathoms measured respectively 19 and 17·5 c.c.'s, while that from the bottom measured 70 c.c.'s. The contents of these gatherings did not differ much from those collected in June, except that *Calanus* appeared to be more immature.

September.—The September gatherings somewhat resembled those of the previous month, but *Euchæta* appeared to be rather more frequent, and in some of the hauls formed about 1 per cent. of the catch. The hauls from 15 and 30 fathoms measured respectively 2·5 and 5 c.c.'s, and that from 45 fathoms 21 c.c.'s. The next two gatherings—the one from 60 fathoms and the other from the bottom—differed considerably. The one measured only 15 while the other measured 60 c.c.'s. A few *Rhoda raschi* and *Nyctiphanes* occurred in the gatherings from deep water, and a small number of Sagitta were also observed, but *Calanus* was the predominating species in all the gatherings.

October.—The hauls collected in October from 15, 30, and 45 fathoms were small, and measured 3, 2·5, and 6 c.c.'s respectively, but those from 60 and 70 fathoms measured, the one 55 and the other 115 c.c.'s. The contents of the various hauls were similar to those collected during the previous month.

1907.

The gatherings collected in 1907 numbered twenty-four. They were all vertical hauls. Five of them were collected in April and May, four in September, and five in October and December, as described below:—

April.—The distribution of the pelagic crustacea, and especially of *Calanus*, was shown by the gatherings collected in April to be more or less uniform from 30 fathoms downwards, and also to be fairly abundant. Above 30 fathoms they were apparently scarcely so numerous. The five hauls collected at this time measured respectively 8, 16, 20, 16, and 14 c.c.'s. The last gathering, which was from 73 fathoms, contained a few *Euchæta*, *Nyctiphanes*, and Sagitta in addition to *Calanus*, which constituted the chief portion of this as well as of the other gatherings mentioned.

May.—The gatherings collected in May from 15 and 30 fathoms measured respectively 8·5 and 8 c.c.'s, while the others from 45, 60, and 73 fathoms measured 20, 25, and 18 c.c.'s. The contents of the several gatherings resembled those collected in April, except that *Euchæta* was rather more numerous in the haul from 73 fathoms, and formed about 3 per cent. of this gathering. A few specimens of *Nyctiphanes* and *Rhoda raschi* were also observed.

September.—Four gatherings were collected in September. The first three, taken at the usual depths, were comparatively small; the one from 15 and that from 30 fathoms measured 5 c.c.'s each, and the other from 45 fathoms 6 c.c.'s. But while these gatherings seemed to indicate that pelagic crustacea were not very plentiful down to 45 fathoms, that from 67 fathoms showed them to be moderately abundant towards the bottom. This gathering measured 130 c.c.'s. All the gatherings consisted for the most part of *Calanus*; *Pseudocalanus* and *Acartia clausi* occurred in small numbers (less than 1 per cent.) in the hauls from 15 and 30 fathoms, and a few specimens of *Nyctiphanes* and *Rhoda raschi* in that from 67 fathoms.

October.—The gatherings collected at this station in October showed that the tendency of the pelagic crustacea to crowd towards the bottom was even greater than in the previous month. The hauls from 15 and 30 fathoms measured only 2 c.c.'s each, and that from 45 fathoms 5 c.c.'s. The haul from 60 fathoms was also comparatively small, while a gathering from near the bottom (77 fathoms) measured 168 c.c.'s. These, like the September gatherings, consisted almost entirely of *Calanus*.

December.—The gatherings collected in December differed little from those just described, and showed a somewhat similar inequality in the distribution of the pelagic crustacea. The gatherings consisted chiefly of *Calanus*. A few other species, comprising *Euchæta norvegica*, *Rhoda raschi*, and *Nyctiphanes norvegicus*, and also Sagitta, were observed, but they occurred very sparingly.

1908.

The number of gatherings collected at this station in 1908 was thirty-four or thirty-five. Three were collected in February, four in March, and the same number in May. Five or six were collected in June, five in August, four in September, three in November, and five in December, as described below.

February.—The three gatherings collected in February were from 15, 30, and 45 fathoms, and measured respectively 20, 23, and 45 c.c.'s. The first two consisted entirely of *Calanus*, no other species being observed, while the third differed only in that it contained a few Sagitta.

March.—The gatherings collected in March comprised four hauls. The smallest gathering was that from 15 fathoms and the largest from 30 fathoms; these two measured respectively 4 and 25 c.c.'s. The other two from 45 and 60 fathoms measured, the one 17 and the other 21 c.c.'s. These gatherings, like those collected in February, consisted almost entirely of *Calanus*.

May.—Four gatherings were also collected in May. They resembled those just described in that they consisted almost entirely of *Calanus*, but the haul from 15 fathoms was rather larger than either of the next two from 30 and 45 fathoms, and was only slightly less than that from 60 fathoms, the measurements being as follows:—The haul from 15 fathoms measured 20 c.c.'s, that from 30 fathoms 18 c.c.'s, while the others from

45 and 60 fathoms measured respectively 19 and 21 c.c.'s. These gatherings showed that the distribution of *Calanus* was fairly uniform from 15 fathoms downwards.

June.—The gatherings collected in June showed a moderate increase in the various catches except that from 30 fathoms, which amounted only to about two-thirds of that for May from the same depth. The gatherings from 15, 30, 45, and 60 fathoms measured respectively 29, 11, 30, and 32 c.c.'s. Two other hauls from 78 and 80 fathoms measured each 50 c.c.'s. The contents of these various hauls were similar to those previously described.

August.—The five hauls collected in August exhibited still further changes in the distribution of the pelagic crustacea, and there also appeared to be a falling off in the number of these organisms in the upper strata, and at the same time a marked increase towards the bottom of the loch. While the gatherings from 15, 30, and 45 fathoms measured respectively 6·5, 13·5, and 23·5 c.c's, those from 60 and 75 fathoms measured, the one 41 and the other 100 c.c.'s.

September.—All the gatherings collected in September were small, showing that a considerable decrease in the number of pelagic crustacea all over the loch had taken place since the station was visited in August. The hauls, taken in the same order as before, measured respectively 2·5, 2, 3, and 6 c.c.'s, and though *Calanus* continued to be the more common species, there appeared to be a larger number of *Euchæta* present, especially in the haul from 60 fathoms. In this haul *Euchæta* formed about 1 per cent. of the gathering. A few specimens of *Pseudocalanus* were also observed, as well as a small number of Sagitta.

November.—Three vertical hauls were collected in November. One from 15 fathoms was nearly blank. A gathering from 45 fathoms was also small, and measured only 1 c.c. It consisted chiefly of *Calanus*, together with a small number (about 2 per cent.) of *Euchæta norvegica*. A third haul from 60 fathoms was moderately large, and measured 20 c.c.'s, and, like the others, it consisted for the most part of *Calanus*. A few *Euchæta*, *Rhoda raschi*, and a small number of Sagitta were also present.

December.—The gatherings collected in December from 15 and 30 fathoms measured only ·5 and 1·5 c.c's., that from 45 fathoms was somewhat larger, and measured 6·5 c.c.'s. Below this pelagic crustacea were met with in considerable abundance; hauls taken at 60 and 70 fathoms measured respectively 47 and 90 c.c.'s.

Other Gatherings Examined.

A few gatherings were collected in the vicinity of Skate Island in April 1905 and June 1906. The former comprised three horizontal hauls and five vertical ones, and the latter, four hauls, which were also vertical. Three vertical hauls were also taken off Minard, two in March and one in November 1908. All these gatherings, collected with the usual tow-nets, did not differ greatly in their contents from those taken in other parts of Loch Fyne.

In October 1906 several hauls were made off Inveraray and also off Newton with a large "mid-water" net, and considerable quantities of *Calanus*, *Euchæta norvegica*, *Nyctiphanes norvegicus*, and *Rhoda raschi* were captured, but with the exception of a quantity of Sagitta little else was observed in these gatherings.

The following tables show the number of vertical hauls collected at each of the six stations mentioned in the preceding notes, the year and month when collected, and the depth from which the various hauls were taken. The quantity of each haul is also stated, in most cases in cubic centimetres (c.c.'s), but some hauls which measured less than 1 c.c. are marked "sm."—small. The horizontal hauls are left out, as no such gatherings were taken after 1905.

STATION I.

B. = bottom. s.m. = gathering small—quantity less than 1 c.c.

Months when Collections were made.	1905.					1906.					1907.					1908.				
	Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from					Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from					Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from					Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from				
	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms	30 fms	45 fms	60 fms	B.
February - -	...	2·5	?	2·5	*1·5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
March - -	s.m.	s.m.	s.m.	s.m.	s.m.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
April - -	2·5	5·5	2·5	2	2	s.m.	s.m.	s.m.	...	s.m.	s.m.	1·5	2	2	s.m.	...	...	...	...	...
May - -	3·5	3	3	5	7·5	...	...	...	...	...	27	17	23	29	42	...	...	...	...	...
June - -	3	11·5	20·5	25·5	55	3·5	10·5	9·5	20	25	...	...	...	...	...	6.5	10	11	22.5	41
August - -	1·5	2·5	6	50	14	3	7·5	15·5	20·5	100	Nets lost.			...	45	3·5	3·5	6·5	19	10
September -	1	1	2·5	9·5	25	1	1·5	1·5	15·5	70	s.m.	1·5	21	80	170	...	...	...	...	...
October - -	...	...	...	...	...	s.m.	s.m.	1	24·5	55	s.m.	s.m.	1	2	3·5	...	...	...	...	...

* Also a haul from 70 fms. measured 2·5 c.c.'s.

STATION II.

Months when Collections were made.	1905.					1906.					1907.					1908.				
	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms	30 fms	45 fms	60 fms	B.
January - -	s.m.	5·5	11	60	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
March - -	...	...	s.m.	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	1·5	...
April - -	s.m.	s.m.	s.m.	...	1	...	...	...	...	...	s.m.	1·5	1·5	2	3	...	...	...	...	...
May - -	2.25	4·5	4	8	8	...	...	...	...	...	8	7	12	17	9	10	9	31	17	...
June - -	...	...	...	...	...	7	5·5	7	10·5	...	80	55	15	22	25	5·5	9·5	11·5	14·5	15·5
August - -	1	2	8	12·5	...	1	3·5	20	37	30	...	...	...	...	...	2·5	2	3·5	6·5	...
September -	...	...	...	...	...	s.m.	s.m.	1·5	2·5	20	1	1·5	4·5	21	...	...	...	...	...	...
October - -	...	...	...	...	...	s.m.	s.m.	s.m.	3·5	23	s.m.	s.m.	1	8	40	...	...	...	...	...
December -	...	...	...	...	...	...	...	...	...	...	4	25	82	115	...	5	11	47	63	40

STATION V.

B. = bottom. s.m. = gathering small—quantity less than 1 c.c.

—	1905.					1906.					1907.					1908.				
Months when Collections were made.	Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from					Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from					Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from					Quantities in cubic centimeters (c.c.'s) of Vertical Hauls from				
	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms	30 fms	45 fms	60 fms	B.
January - -	12	24·5	30	35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
February - -	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	20	31·5	55	...
March - -	18	19	26	25	...	...	...	...	...	...	...	...	...	...	...	16	20	26	...	...
April - -	5	13	19	22·5	...	7	5	16	12	...	...	...	...	70	...	...	...	...	...	...
May - -	†3·5 4·5	5 10·5	... 5·5	...	...	...	...	...	...	...	17	18	15	21	...	14	35	42	40	...
June - -	...	...	...	...	...	7·5	8·5	13·5	17	...	6	13	15	15	...	3	3·5	6	12	...
August - -	1·5	3·5	3	...	...	11	5·5	67	...	...	...	...	...	...	...	5·5	18·5	25·5	45	...
September -	1·5	2	4	15·5	...	3·5	4	5	24	...	9	22	19·5	90	...	s.m.	s.m.	2	15·5	...
October - -	1	1	3	7	...	1	1·5	5	16	...	1·25	6	9·5	19	...	...	...	...	...	...
November -	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	s.m.	s.m.	s.m.	...	...
December -	...	...	...	...	...	...	...	...	...	...	s.m.	1·5	1	13	...	s.m.	1	9	33·5	...

STATION VI.

—	1905.					1906.					1907.					1908.				
	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms.	30 fms.	45 fms.	60 fms.	B.	15 fms	30 fms	45 fms	60 fms	B.
January - -	11·5	17	20	40	45	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
February - -	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	20	33	45	...	...
March - -	*1·5	†1·5 1·5	†s.m. 3	†s.m. 2·5	...	...	...	...	...	...	...	...	...	...	...	4	25	17	21	...
April - -	5·5	4	9	4	4	5	5	7	11·5	8	8	16	20	16	14	...	...	...	...	...
May - -	9	9·5	...	12	42	...	...	...	...	...	8·5	8	20	25	18	20	18	19	21	...
June - -	4·5	7	12	9·5	14·5	25	22·5	24	35	40	...	...	...	...	...	29	11	30	32	†50 50
August - -	3·5	5·5	11·5	22·5	...	3·5	3·5	19	17·5	70	...	...	...	...	...	6·5	13·5	23·5	41	100
September -	4·5	5	†4·5 9	75	125	2·5	5	21	15	60	5	5	6	...	130	2·5	2	3	6	...
October - -	1	1	1·5	25	170	3	2·5	6	55	115	2	·2	5	18	168	...	...	...	...	...
November -	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	s.m.	s.m.	1	20	...
December -	...	...	...	...	...	...	...	...	...	...	1·5	2	3	62	110	s.m.	1·5	6·5	47	90

* Also a haul at 20 fms. = s.m.

† Two hauls at same time and place.

STATION IV. STATION III.

B. = bottom. s.m. = small—quantity less than 1 c.c.

Months when Collections were made.	Quantities in cubic centimeters (c.c.'s) of Vertical Hauls collected in								Quantities in cubic centimeters (c.c.'s) of Vertical Hauls collected in							
	1905 from		1906 from		1907 from		1908 from		1905 from		1906 from		1907 from		1908 from	
	15 fms.	B.	15 fms.	B.	15 fms.	B.	15 fms.	B.	15 fms.	B.	15 fms.	B.	15 fms.	B.	15 fms.	B.
January - -	...	...	...	...	...	...	...	...	s.m.	2·5	...	...	...	...	...	...
February -	2·5	2·5	...	...	...	...	...	...	...	...	...	...	...	...	3·5	3·5
March -	* s.m.	*1	...	...	...	...	...	...	s.m.	s.m.	...	...	...	...	2	3
	s.m.	s.m.														
April -	* s.m.	1	s.m.	s.m.	1·5	3·5	...	...	2·5	3·5	1·5	2·5	s.m.	1·5	...	...
	1·5															
May -	* s.m.	*1	...	...	10	11	13	16	s.m.	* s.m.	...	...	11	13	7·5	9·5
	1	1·5								s.m.						
June - -	s.m.	s.m.	3	6	1	3	...	...	1·5	1·5	3·5	4·5	8	14	1·5	5
August - -	s.m.	1	1	1·5	2·5	2·5	s.m.	s.m.	s.m.	s.m.	3	2·5	...	...	s.m.	2
September -	1·5	1·5	s.m.	s.m.	2·5	2·5	s.m.	s.m.	s.m.	1	1	1	2	1·5	s.m.	s.m.
October - -	s.m.	s.m.	s.m.	s.m.	1	1·5	...	...	s.m.	s.m.	s.m.	1	...	s.m.	...	...
November -	...	...	...	...	...	...	s.m.	s.m.	...	...	...	...	...	...	s.m.	s.m.
December -	...	...	...	...	s.m.	2·5	...	2·5	...	...	...	...	1	1·5	8	11

* Two hauls at same time and place.

List of the Species of the Crustacea obtained in the Gatherings from Loch Fyne described in the preceding Notes.

COPEPODA.

Nearly all the Copepoda observed belong to the division *Calanoida*, G. O. Sars. Two species belong to the *Harpacticoida*, one to the *Cyclopoida*, and one to the *Monstrilloida*.

CALANOIDA.

Calanus septentrionalis (Goodsir). This is the *Calanus helgolandicus* of Claus, but Goodsir's is the older name. It does not differ greatly from *C. finmarchicus* (Gunner), and perhaps should be still included in that species. It is the most common and generally distributed species in our seas, and it is also the most important, as it forms a large part of the food of the herring.

Paracalanus parvus, Claus. This small species occurred in gatherings from Stations V. and VI. and one or two other stations, but always rather sparingly.

Pseudocalanus elongatus, Boeck. This species is generally distributed, and sometimes moderately common in Loch Fyne. It occurred in most of the gatherings examined.

Bradyidius armatus, Vanhöffen. This species occurred sparingly at Stations II., V., and VI., and one or two other stations.

Euchæta norvegica, Boeck. Plentiful in large "mid-water" and "ring" net gatherings collected off Inveraray and Newton in October 1906, and more or less sparingly in gatherings collected with the ordinary tow-net, at most of the stations referred to in the preceding notes.

Diaixis pygmæus (T. Scott). Rare in a bottom gathering collected at Station IV., Upper Loch Fyne, March 1905.

Centropages typicus, Kröyer. This species appeared to be rare in Loch Fyne. The only gathering in which it was observed was in a vertical haul from 15 fathoms collected at Station II. in August 1905. Mr. W. L. Calderwood has also recorded this species from E. Loch Tarbert (Lower Loch Fyne). *15th Annual Report, Fishery Board for Scotland*, Part III., p. 146 (1897).

Centropages hamatus (Lillj.). This occurred in many of the gatherings examined, and was occasionally moderately frequent.

Temora longicornis (O. F. Müller). *Temora* was observed sparingly in gatherings from several stations, and appeared to be generally distributed.

Metridia lucens, Boeck, occurred rather sparingly in gatherings collected at Stations II., III., V., and VI., and at one or two other stations.

Anomalocera patersoni, Templ., was obtained usually in surface gatherings or in gatherings from near the surface at several stations, but always in small numbers.

Parapontella brevicornis (Lubbock). This was one of the rarer species observed. It occurred in gatherings from Stations II., III., and VI., and one or two other stations.

Acartia clausi, Giesbrecht. Hitherto this is the only species of Acartia that has been recorded from Loch Fyne. Is occurred, though somewhat sparingly, in a large proportion of the gatherings examined.

HARPACTICOIDA.

Zosime typica, Boeck. This species was observed in a gathering from Station V. in 1905.

Harpacticus uniremis, Kröyer. This species occurred in a gathering collected off Skate Island.

CYCLOPOIDA.

Oithona similis, Claus. This species was moderately rare in gatherings from Stations II. and III.

MONSTRILLOIDA.

Thaumaleus rigidus, I. C. Thompson. The only gathering in which this species was met with was one from Station IV., collected in August 1906.

AMPHIPODA.

Most of the Amphipoda recorded here occurred in bottom hauls.

Parathemisto oblivia (Kröyer) was obtained in one of the gatherings collected at Station VI. in March 1905.

Tryphosites longipes (Bate), in a bottom gathering from Station II.

Harpinia pectinata, G. O. Sars. This species was observed in gatherings both from Stations II. and V. Two of the specimens from Station V. were infested with the small crustacean parasite *Sphæronella cluthæ*, T. Scott.

Leucothoe lilljeborgi, Boeck, occurred in a gathering from Station V., collected in April 1905.

Epimeria cornigera (Fabr.).
Iphimedia obesa, Rathke.
Apherusa bispinosa (Bate).

These three species were obtained in a bottom haul from Station III., collected in February 1905.

Dexamine spinosa (Montagu) occurred in one of the gatherings collected in April 1905 at Station VI.

Stegacephaloides christianiensis (Boeck) was obtained in a gathering from Station II., collected in May 1905.

Gammarus locusta (Linné), Station V., August 1905.

ISOPODA.

Three species belonging to the Chelifera, one to the Flabellifera, and one to the Asellota were obtained in bottom gatherings, viz. :—

Leptognathia brevimana (Lilljborg). This species occurred sparingly in gatherings both from Station II. and Station V.

Leptognathia breviremis (Lilljeborg). In a gathering from Station V.; rare.

Pseudotanais forcipatus (Lilljeborg). This species was observed in gatherings from Station V., collected in March and April 1905.

Eurydice pulchra, Leach. Rare in a surface gathering collected off Inveraray in October 1906.

Janira maculosa, Leach. Station II. in May 1905.

SYMPODA.

The following species of crustacea belonging to this group have been observed in the gatherings that have been examined :—

Leucon nasicus (Kröyer). Station V., in a bottom gathering collected in April 1905.

Eudorella truncatula (Bate). This occurred in the same gathering with the last.

Diastyloides biplicata, G. O. Sars. In a bottom gathering collected in the vicinity of Station VI.

Leptostylis sp. In the same gathering with the last was a specimen of *Leptostylis* which was not satisfactorily determined, but probably belonged to *L. villosa*, G. O. Sars.

Campylaspis rubicunda, Lilljeborg. Was obtained in a bottom gathering from Station I. It has also been collected near Lowburn.

Campylaspis costata. Collected in the vicinity of Station V. in the same gathering as the *Diastyloides* mentioned above.

SCHIZOPODA.

Five species belonging to this group were observed, viz. :—

Nyctiphanes norvegica, M. Sars. Abundant in gatherings collected with large "mid-water" and "ring" nets off Inveraray and Newton in October 1906, and also, but more or less sparingly, in gatherings from Kilfinnan Bay, Barmore, Furnace, and Strachur Bays, etc.

Rhoda raschi (M. Sars). Common in the same gatherings with *Nyctiphanes* collected off Inveraray and Newton, and sparingly in gatherings from most of the stations referred to in the preceding notes.

Leptomysis gracilis, G. O. Sars. In a gathering from Station II., collected in February 1908.

Hemimysis lamornæ (R. Q. Couch). This small and brightly-coloured species was also obtained in Station II., in a gathering collected in May 1905.

Schiztomysis ornata (G. O. Sars). Station III., in a gathering collected in February 1905.

DECAPODA.

The following are a few Decapod species which were also observed in some of the gatherings. They all belong to the Caridea.

Crangon allmanni, Kinahan. Obtained in a gathering collected at Station II.

Hippolyte securifrons, Norman. Collected in Station II. in May 1905.

Caridion gordoni (Bate). Obtained in the same gathering with the last.

Pandalus montagui, Leach. This also occurred in the gathering from Station II. with the two species just recorded.

Pandalina brevirostris (Rathke). Station III., February 1905.

Pasiphæa sivado (Rizzo). This species was obtained in a gathering collected in the vicinity of Station VI. in March 1905.

Larval forms belonging both to the Decapoda and Schizopoda were also occasionally met with, but usually more or less sparingly. *Evadne nordmanni* and *Podon leuckarti* were also observed, as well as a few specimens of Ostracoda, *i.e.*, *Cytheridea papillosa* and others.

Sagittæ were also present in many of the gatherings, but usually in small numbers.

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